

UNIVERSITY OF CALIFORNIA.

AGRICULTURAL EXPERIMENT STATION.

BULLETIN NO. 23.

[In order to render the results of investigations and experiments conducted by the Agricultural Department of the University of California more quickly and more generally available than has heretofore been done through the annual or biennial reports, it is proposed to embody hereafter, in the form of "Bulletins," to be issued as often as may seem desirable, reports of results, as well as such other discussions, information or answers to questions as may be of general interest. It is intended to make these bulletins, as a rule, short enough for insertion in the daily or weekly papers of the State, and proof-slips of the same will be regularly mailed to papers applying therefor. The substance of these bulletins are ultimately to be embodied in a more complete and connected form, in the annual reports of the College of Agriculture.]

Vintage Work in the Viticultural Laboratory, 1884.

As heretofore stated, the plan of work in the viticultural laboratory is based upon the obvious fact that "among the first necessities of the present situation of California wines in the world's market, is the establishment of more definite qualities and brands, resulting from a definite knowledge of the qualities of each of the prominent grape varieties, and of their influence upon the kind and quality of the wine, in blending before, or as the case may be, after fermentation; of the treatment required by each in the cellar, during the time of ripening; and finally, of the differences caused by difference of location, climate, etc., as well as by different treatment of the wines themselves."

"In the wine-producing countries of Europe this knowledge has been acquired by long experience; and chemical investigation has subsequently in a great measure ascertained the natural conditions upon which the attainment of certain results in wine-making depends. The principles thus evolved can be applied to new conditions, such as those existing in California, and thus save to a great extent the laborious and costly experimenting which has been gone through heretofore, by formulating into generally intelligible rules the knowledge which otherwise usually remains the trade secret of a few experts."

"It should be fully understood and remembered that while peculiarities and defects shown by analysis are perfectly definite indications as to the conditions that *must* be fulfilled in a successful blend, yet, analysis cannot as yet take cognizance of the delicate and almost intangible flavors or "bouquets," which must likewise be made to harmonize, in order to satisfy a cultivated palate. To that extent the determination of the proper blends must always remain with the expert wine taster; but the work of the latter is immensely facilitated by being informed, through the analysis, of the prominent chemical peculiarities, which in any

case must be taken into consideration, and which ordinarily are left to laborious and more or less blind guessing and experimenting."

In conformity with these views, in past years a number of the more prominent grape varieties already cultivated in the State, have been made into both red and white wines each,* and each thereafter subjected to the test both of chemical analysis and taste. Some of the results of this work, have been given to the public in previous reports, as well as in the series of bulletins begun this year; and the importance of this method of determining in advance the probable outcome of heavy pecuniary investments, has seemed so obvious as to induce not only numerous individual requests for the examination of grapes from different localities, but also the offer on the part of the Natoma Water and Mining Co., at Folsom, to supply to the Laboratory experimental lots of each of a large number of newly imported grape varieties, now fruited for the first time in this State, and also to furnish proper packages for treating the same; in order that definite results as to the wine-making qualities of these varieties might be elicited as quickly as possible, for the public benefit as well as for that of the Company; a considerable share of whose vineyard is yet to be planted, the choice of vines for the same depending largely upon the outcome of these experiments.

It may be necessary to allude here to a common prejudice on the part of vintners, to the effect that small-scale experiments in wine making can but remotely lead to a correct estimate of the results to be expected on the large scale, and that they frequently mislead to such an extent as to cause grave financial losses. Were this true, of course there would be little use for laboratory experiments on the small scale of ours.

What is true, however, is that small scale experiments do not lead to correct results when made in large cellars alongside of the large quantities there treated. This cannot be otherwise, from precisely the same causes which have led to the almost universal abandonment of the immense tanks used in the older wineries of the State, in favor of those not exceeding much the capacity of 2,000 gallons. If the 10,000 gallon tank yielded poor results when placed in the same conditions as the 2,000 gallon ones, it is obvious that there must be a similar difference, at least, between the 2,000 gallon tank on the one hand and the 5 or 10 gallon experimental keg on the other.

These differences are due in the main to the different temperatures under which the fermentation takes place. When the fermenting masses are large, the temperature will often rise so high as to actually check fermentation, making it difficult to revive it, and leading to the ultimate setting-in of abnormal fermentations, resulting in "milk-sour" wines. When

*In the case of white grapes, of course, "red" implies simply the mode of treatment, viz.: Fermenting on the skins as in the making of red wines properly so called.

the masses are very small, on the contrary, the regular course of the fermentation is liable to be interfered with by such small variations of temperature in the fermenting rooms as will leave masses of proper amount—say 1,000 to 2,000 gallons, almost unaffected. Hence, a 10-gallon keg in a cellar and temperature adapted to the proper fermentation of large packages, can only accidentally furnish results correctly representing large scale operations.

It is quite otherwise in a cellar of which the temperature can be regulated at will, and with special adaptation to small packages; when the latter will furnish wines closely corresponding to those that will be produced under correct practice on the large scale. It need hardly be said that the temperature must be kept higher than would be admissible in a cellar containing 2,000-gallon packages, which would under such circumstances be liable to the same inconveniences as those met with in the use of very large tanks.

It would have been desirable to vary somewhat the cellar temperature for different wines during their first fermentation; but as there was only a single room at command, an average was struck in maintaining the thermometer, as a rule, between 68 and 70 degrees, day and night. It was found that under these conditions the temperatures of the fermenting musts were about the same as usually found in the 2000-gallon tanks, and that the fermentations were completed within about the same average times.

The size of the fermenting kegs varied from one to ten gallons, in consequence of the impossibility of obtaining the same amount of grapes in all cases. It would be desirable that the quantity of must or murk should never fall below five gallons, and not exceed ten, in any one package.

In every case wine was made of each variety of grapes separately, and each must was analyzed on the day it was pressed; but whenever feasible, blends of several kinds promising good results when so combined; were also made prior to fermentation, since in that case the union becomes more perfect and sometimes the results differ materially from those obtained when the wines, ready made, are blended. In making these blends two points were kept in view. One, the production of the best results in accordance with the established demands of the market, irrespective of the grape varieties now existing in the vineyards of the State; second, the production of the best blends on the basis of those varieties of which a large proportion has already been planted in our vineyards, and the conversion of which into marketable types adapted to the established taste is a matter of grave interest to those concerned. Prominent among such varieties is the Zinfandel, which is believed to form nearly half of the planting done in the State, and yet, unblended, does not altogether meet the approval of the consumers of clarets. Of this grape, therefore, quite a number of blends have been tried, both before and after fermentation.

The following table shows in summary form the amount and kind of the work done this season, and the contributions received from various sources:

Contributor.	Red Grapes.		Whites Grapes.	
Natoma W. & M. Co., Folsom.....	22		22	
C. W. Howard, Lower Lake.....	1			
H. A. Pellet, St. Helena.....	2			
Wm. Scheffler, St. Helena.....	1			
J. L. Block, Livermore.....	1		1	
P. W. Butler, Penryn.....	1		1	
E. B. Smith, Martinez.....	1			
J. T. Doyle, Mountain View.....	1			
H. Mel, Glenwood.....	1			
H. Hagen, Napa.....	1			
Stern & Rose, San Gabriel.....	1		1	
H. Langenberger, Anaheim.....	1			
Geo. West, Stockton.....	1			
L. P. Berger, Lakeport.....	1			
Wm. Pfeiffer, Gukerville.....	3			
H. W. Crabb, Oakville.....	2			
R. Barton, Fresno.....			1	

The wines made were:

Of Claret and Burgundy types.....	36
Dry White, Sauterne, etc.....	19
Ports.....	5
Sh rries.....	7

Total Wines of Single Varieties..... 67

Grape blends, viz.:

Red, Claret and Burgundy types.....	15
Dry White, Sauternes.....	2
Ports.....	2

Total Grape Blends..... 19

Total Wines made..... 86

As may well be supposed, the making of and caring for these eighty-six wines could not be accomplished by the single assistant usually employed in the viticultural laboratory. For several weeks Mr. Jaffa was constantly assisted by the assistant in the general laboratory, Mr. Morse, and by Mr. F. Pohndorff, Jr., as volunteer; besides a laborer for about two weeks. For the management and supervision of the work, and more especially in the determination of the blends, Mr. F. Pohndorff, Sr., the distinguished wine expert, has given a generous proportion of his time throughout the vintage season; and the measure of success with which so large a number of different wines and packages has been handled under the restrictions imposed by the limited means at our command, is largely due to his intelligent direction. Under the same, samples of all the wines made, and of additional (wine) blends, are now being prepared for inspection at the coming viticultural convention; and the more important ones are being analyzed as rapidly as possible, with the aid of an additional temporary assistant furnished by the Viticultural Commission for the emergency. It will be found that among the new varieties from the Folsom vineyard there is a number of the highest merit and promise, whether by themselves or for blending purposes, maintaining precisely the position assigned to them among European vintners, and proving conclusively that the attainment of high standards of quality in our wines is merely a question of a proper selection of varieties and of intelligent management.

The elaboration of the results of this season's work will of necessity delay the publication of the full report on the same beyond the usual time; but it is hoped that for the coming season, a more liberal provision of means and appliances will be made by legislative appropriations, as it is hardly to be expected that the same amount of voluntary assistance can be secured every season.

E. W. HILGARD.

Berkeley, Nov. 20, 1884.